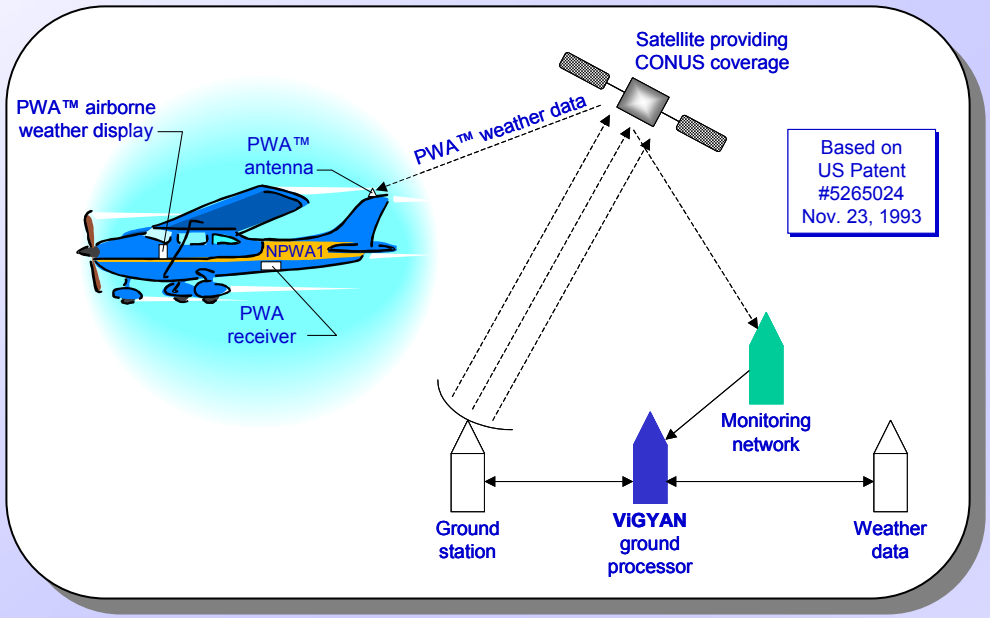
PILOT WEATHER ADVISOR™



ViGYAN

Rockwell Collins

Keith D. Hoffler
757-865-1400x221
keithh@vigyan.com
Hampton, Virginia

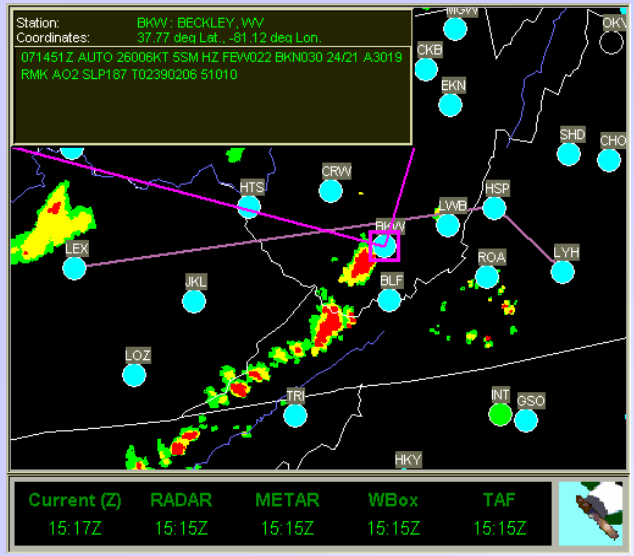
DTN WEATHER SERVICES

NASA Weather Accident Prevention Workshop June 4-7, 2001

ViGYAN
Keith Hoffler
757-865-1400 x221

Outline

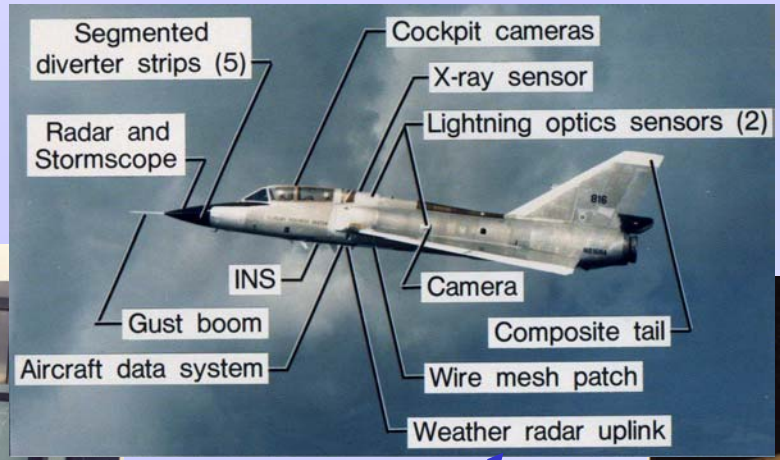
- Brief history of Pilot Weather Advisor™
- Pilot Weather Advisor™ - SBIR Phase III
  - System overview
  - Work planned
- Commercialization of Pilot Weather Advisor™
- Concluding remarks

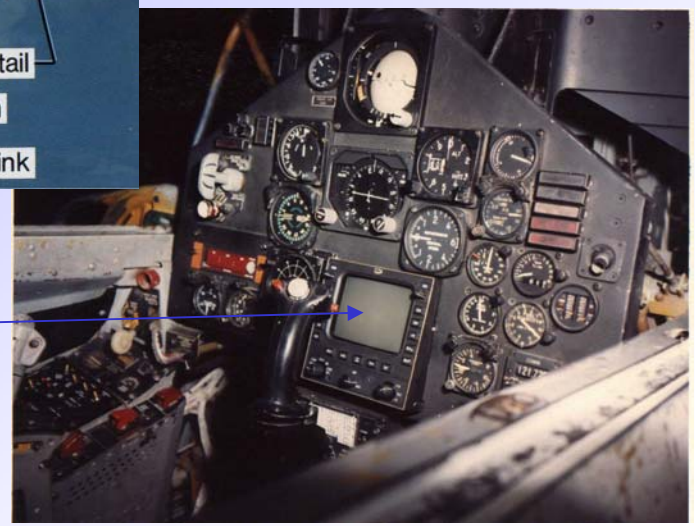


Keith Hoffler
757-865-1400 x221

NASA Storms Hazard Program

- 1978: Program initiated
- 1982: Uplink RADAR data to NASA F-106
- 1988: White paper for FAA “Cockpit Weather Research, Development and Applications-Survey and Recommendations,” Dec. 1988, Branstetter and Crabill
- 1989: System studies of uplinking Wx data to cockpit
- 1991: Weather Data Requirements Report: DOT/FAA/RD-91/9 April 1991





Norm Crabill:
“Why can’t I have this in my airplane?”

ViGYAN
Keith Hoffler
757-865-1400 x221

SBIR Phase I and II

- Phase 1 awarded Dec. 1990 by NASA Langley Research Center
  - Developed display icons and system architecture
  - Demonstrated system using Qualcomm's Omnitrac Satellite system aboard a Piper Malibu (fixed map)
  - Briefed NASA LaRC in '91 (NASA CWIN followed)
- Phase 2 awarded Dec. 1991 by NASA Langley Research Center
  - Developed and demonstrated GPS based moving map in C-182
  - Demonstrated cell phone based datalink before takeoff in a C-182
  - Developed business plan and sought satellite provider
  - Awarded US Patent #5265024 on Nov. 23, 1993

ViGYAN
Keith Hoffler
757-865-1400 x221

Since SBIR Phase II

- Matured system and business components for commercialization
  - Weather data
  - Airborne antenna and receiver
  - Datalink
  - Multi-function display and electronic flight bag
- Serve on RTCA SC-195 committee developing FIS-B MASPS
- Revised client software and ported to CT-1000 and Flight Guide 3000
- Demonstrated in Cessna 182 using satellite phone
- Updated broadcast schedule – from every 15 minutes to 5 minutes
- Developing concepts for additional weather products
  - Lightning
  - Turbulence and icing
  - Winds aloft
  - Others
- Developed revised business plan
- Seek investment
- SBIR Phase III awarded by NASA Glenn – March 2001

ViGYAN
Keith Hoffler
757-865-1400 x221

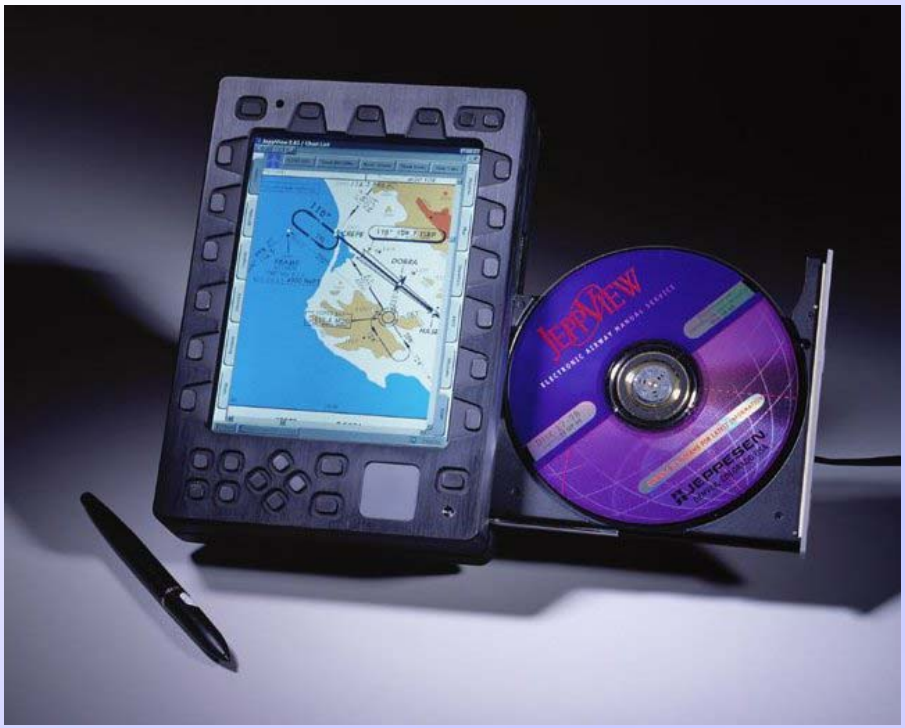
Multi-Function Displays

- GA instrument panels are currently experiencing dramatic changes
  - Satellite navigation, GPS
  - Affordable daylight readable displays
  - FAA's interest in benefits of new technology (FIS-B)
- Multi-Function Displays are becoming widely accepted
  - Panel mounted, portable
  - Wide cost range, applicable to all market segments
  - Ingest, process, and display various types of information
    - Present uses
      - Moving map
      - Engine monitoring
      - Attitude instruments
      - Onboard weather
    - Future capabilities
      - Datalinked weather
      - Traffic
      - Terrain
      - ATC directives

Avidyne display installed in Cessna 182

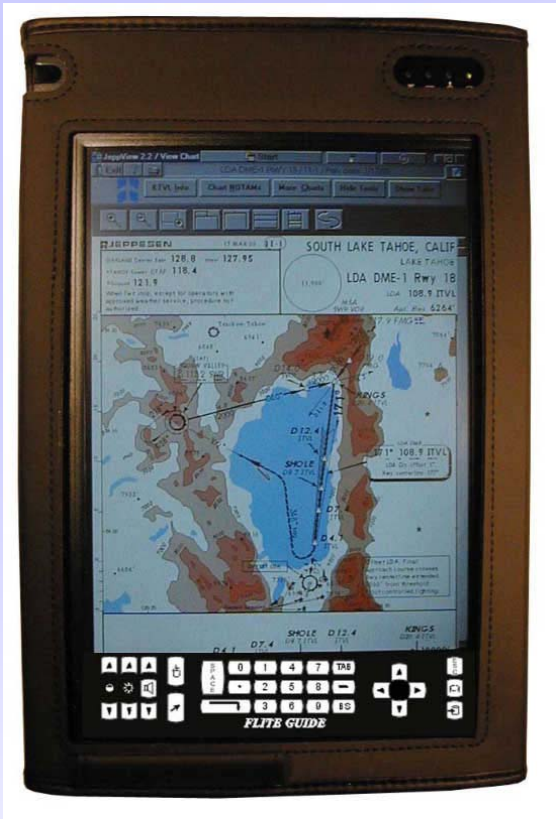
ViGYAN
Keith Hoffler
757-865-1400 x221

Electronic Flight Bags



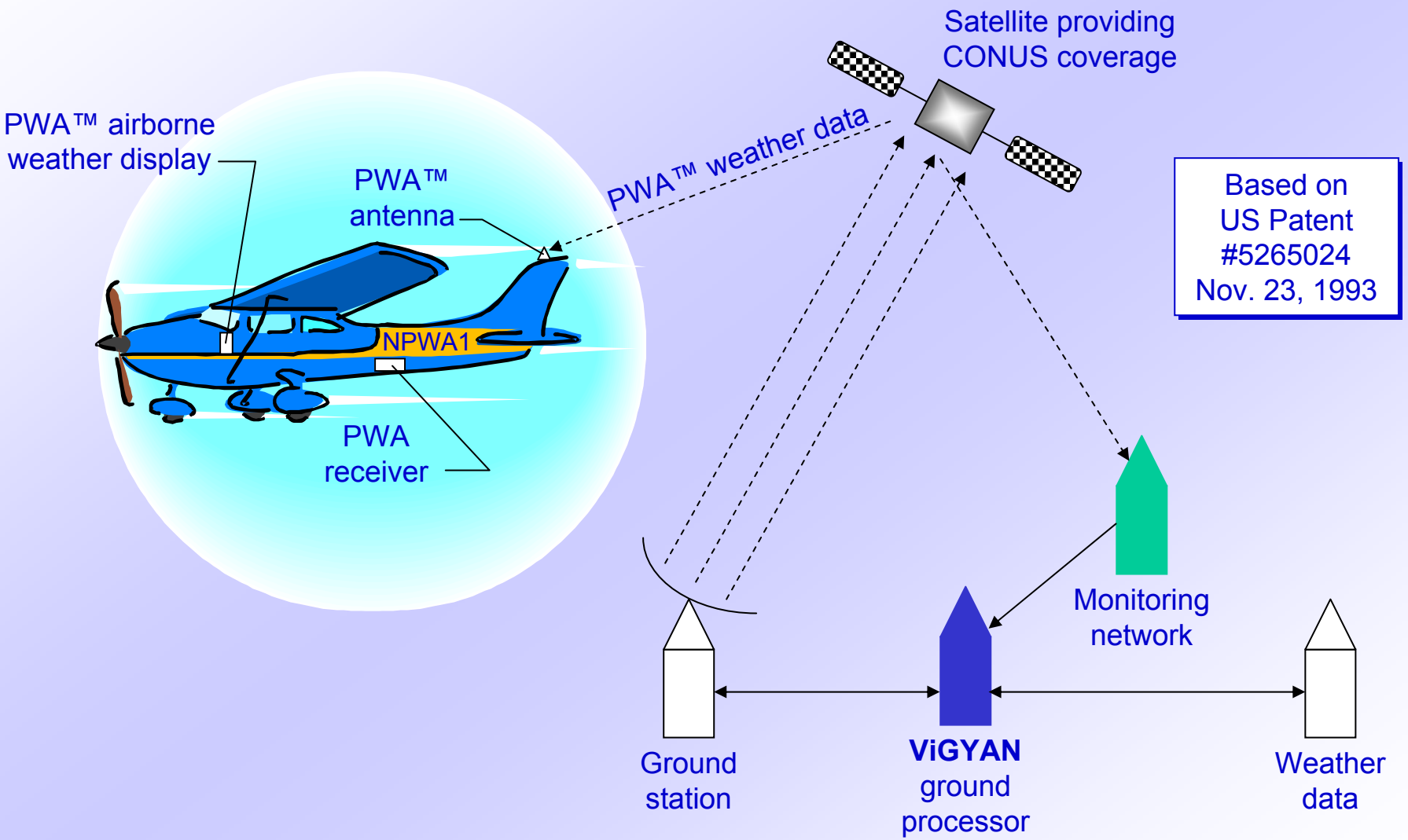
Northstar CT-1000

ADR Flight Guide 3000



ViGYAN
Keith Hoffler
757-865-1400 x221

PWA™ System Diagram



ViGYAN
Keith Hoffler
757-865-1400 x221

Work Planned

- Conform to FIS-B MASPS and MFD platform requirements

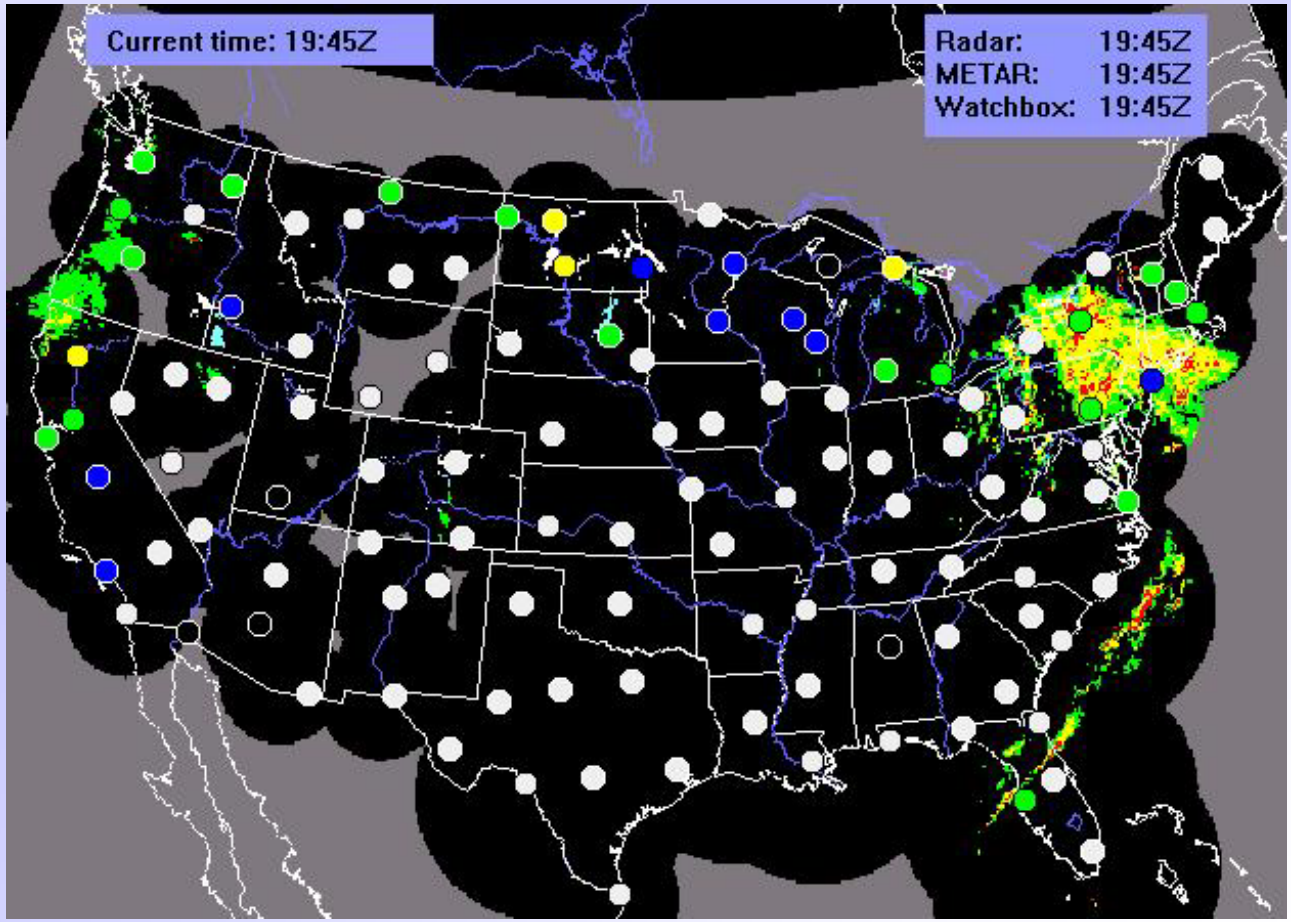
- Develop Hardware
  - Satellite link design: hub and receiver
  - Antenna design and qualify
  - Electronic flight bag
    - CT-1000
    - FlightGuide 3000
  - MFDs

- System Integration and Testing
  - Ground Integration Testing
  - Aircraft In-Flight Evaluations (begin October 2001)

ViGYAN
Keith Hoffler
757-865-1400 x221

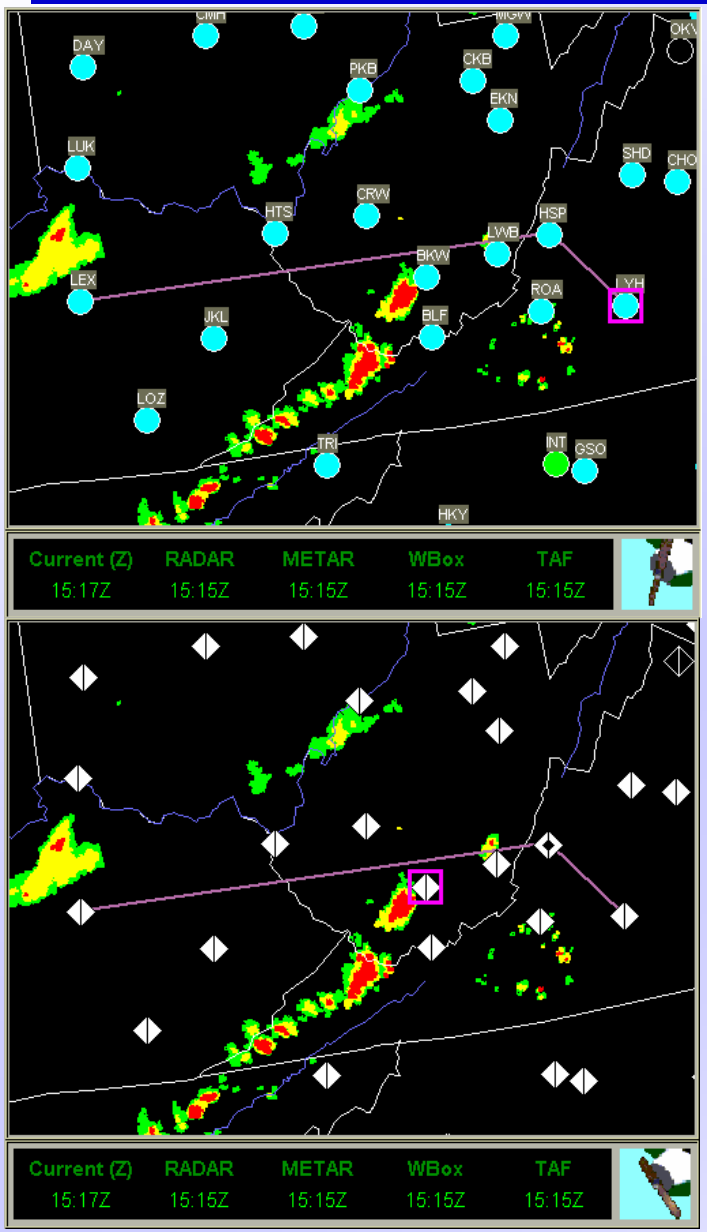
PWA™ Coverage

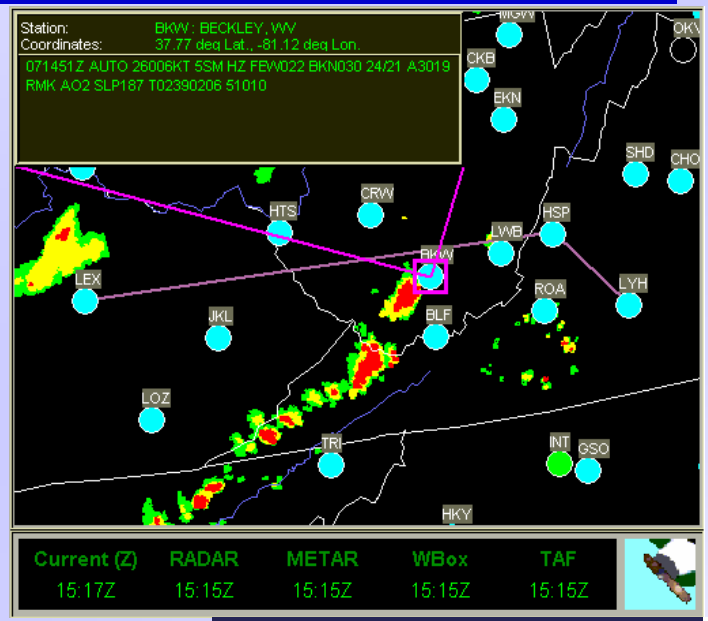
- Full Continental US coverage at all altitudes
- All US data
  - Composite radar
  - METARs
  - TAFs
  - Other



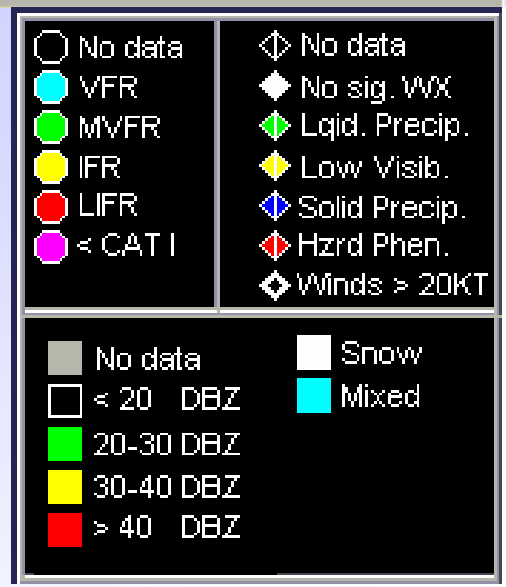
ViGYAN
Keith Hoffler
757-865-1400 x221

PWA™ Images From CT-1000



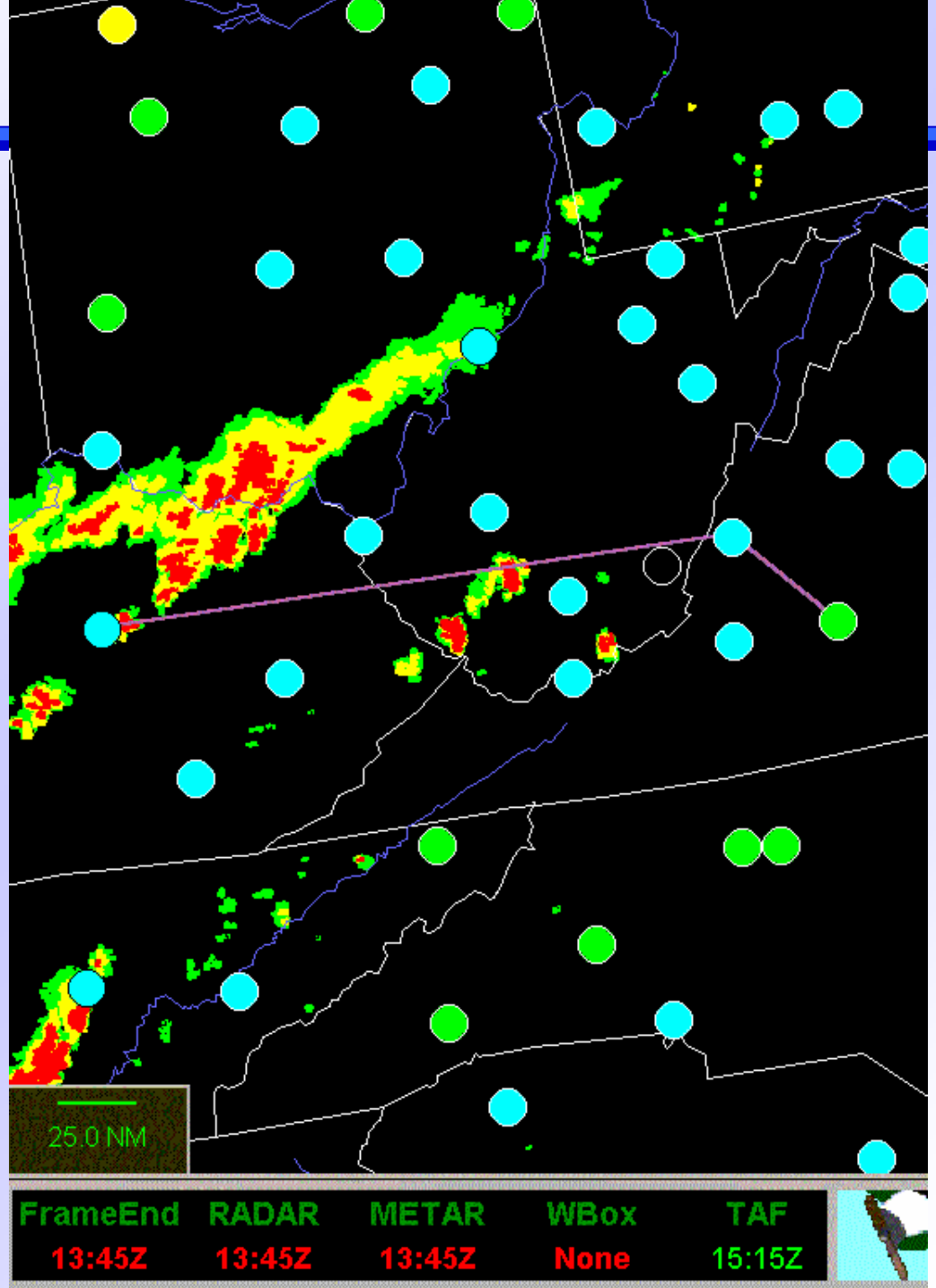


- Colors now compliant with RTCA SC-195 FIS-B MASPS
- Higher resolution radar image (2km grid)
- CT-1000 initial user interface developed
- 5 minute update rate



ViGYAN
Keith Hoffler
757-865-1400 x221

PWA™ Animation Loop



ViGYAN
Keith Hoffler
757-865-1400 x221

PWA™ Commercialization

- ViGYAN has formed **Indra Systems** to commercialize PWA™
- Expect to make first announcement at Oshkosh, 2001
- Flight evaluations begin October 2001
- Limited sales late in 2001
- Expect certification in first quarter of 2002
- Expand to marine and other markets
- Additional weather products in the future

ViGYAN
Keith Hoffler
757-865-1400 x221

Concluding Remarks

- Pilot Weather Advisor™ system will be a NASA R&D and SBIR success story
- System provides continental US coverage at all altitudes
  - All continental US data
  - Automatic continuous updates
- Initial flight evaluations expected in October 2001
- **Indra Systems** has been formed to commercialize the system